5

Westernport — Man's Impact and Marine Planning

By R. M. Perry*

Abstract: This paper sets out the principal factors influencing port planning in Westernport at this time. It outlines current pressures for development and the existing constraints on planning, refers to planning methods and tools, and sets out the nature of possible future developments.

ROLE OF THE PORTS AND HARBORS DIVISION

The Ports and Harbors Division of the Victorian Public Works Department is the Port Authority for Westernport and responsible for the planning, construction, operation and administration of the Port. This control is exercised under the provisions of the Marine Act and the Port Rules made pursuant to that Act.

Up to the present some $14 million have been spent on capital works for Westernport development and a maximum up to 14 million tonnes of cargo (500 vessels) handled in a single year.

DEVELOPMENTS IN THE LAST DECADE

Major development in Westernport commenced in 1963 when the Westernport (Oil Refinery) Act 1963 was enacted to permit the establishment of the BP Refinery (Westernport) Pty. Ltd. The Act also authorized the construction at a cost of $7 million of State-owned port facilities and harbor services for use in the first instance by that Company. These facilities comprised a two-berth marine terminal of steel and reinforced concrete construction at Crib Point, with the main and secondary berths designed for tankers up to 100,000 and 40,000 Dwt respectively. The terminal is served by a 21 km long buoyed channel with minimum widths of 400 m in the undredged and 180 m in the dredged sections. Depths provided are 14·9 m and 14·3 m below chart datum in the channels and the 610 m diameter swinging circle, with 15·8 m and 12·8 m respectively alongside the two berths. Harbor services include two fire-fighting tugs, the navigation aids system, mooring services, and the port office and depot, plus the necessary staff. This first stage was commissioned in July 1966.

In the second stage, the Westernport Development Act 1967 enabled the Esso-Haematite fractionation plant and crude oil storage facility to be established at Long Island Point some three miles north of Crib Point. It also authorized State expenditure of $3·5 million for the construction of a single-berth marine terminal for the export of liquid petroleum gas and crude oil from the Bass Strait fields.

The steel and reinforced concrete jetty structure was designed for 100,000 Dwt tankers (with 15·8 m alongside), but the channel depths in the 240 m wide channel extensions from Crib Point and the 580 m diameter swinging circle were limited to 12·8 m in the first instance for a tanker size of 40,000 Dwt. When additional exploration by Esso-Haematite in Bass Strait indicated that crude oil reserves were larger than first thought, the jetty design was amended somewhat and channel depths increased to 14·3 m to allow 100,000 Dwt tankers to use these facilities immediately after their completion.

The Westernport Development Act 1970 increased the financial limit to $6·05 million to cover for the additional works and also permitted Esso-Haematite to use the Crib Point terminal for export of the increased amounts of crude oil from Bass Strait. It also increased the minimum annual wharfage charge payable by the Company. This second terminal was commissioned in March 1970.

The third stage of development was authorized by the Westernport (Steel Works) Act 1970 which provided for the ultimate establishment by John Lysaght (Australia) Ltd. of a fully integrated iron and steel works on some 680 ha of land at Tyabb. Dredging requirements have been met by the State as provided for by the Act. The Com-

* Chief Engineer (Development), Ports & Harbors Division, Public Works Department, Victoria. 168 Exhibition Street, Melbourne, Victoria 3000.

pany has completed the first stage of development comprising a cold reduction mill and including one Roll On Roll Off berth. A second conventional berth is currently under construction and plans for stage two of the works (a hot strip mill) are in hand.

THE PRESSURES FOR DEVELOPMENT

General Pressures

Ports have always been focal points in the development of any country with a dependence on sea-borne trade, and historically this has been very evident in Australia. The growth and stability of many national and regional industries are very closely associated with shipping and in recent times the economies of scale in both ship sizes and industry have rapidly increased the value of deep-water ports. In Australia the number of these is strictly limited.

The growing economy in Australia is related to increases in population and more importantly to the affluence of our society and a rapidly increasing consumer demand. Unless there is a marked change, then ports such as Westernport must be accorded a very high value as a national resource.

The economics of scale have also become very obvious over the last decade, both in the size of shipping, and the nature of industry and raw material transport. For example on a 8,000 km one-way journey the cost per unit of transporting oil in a 200,000 tonne tanker is about half that of the cost in a 30,000 tonne vessel. Iron ore can now be shipped more economically from West Australia to Japan than to the eastern Australian States. The position has been further influenced by the current bunker fuel situation.

It follows that, to provide for economic development, satisfy consumer demand, and to keep costs in line with other manufacturing nations the value of deep-water ports must be both recognized and protected.

Local Pressures

Many local factors generate pressures for development at Westernport. Some of these are the proximity of the major market of Melbourne and the Port Phillip District, easy access to large areas of undeveloped land suitable for industrial purposes, road transport to the eastern sections of Melbourne and the Latrobe Valley. Further, there are the support facilities and work force (professional, skilled and unskilled) afforded by the neighbouring Port Phillip District, the near energy resources of Bass Strait and the Latrobe Valley, and adequate water supply.

A prime factor is the availability of naturally deep and sheltered water. Vessels of 100,000 Dwt have been provided for with virtually no dredging, and 120,000 Dwt could be accommodated with full use of the tide. The lower reaches of the port could accommodate vessels to 200,000 Dwt but only with some deepening of the entrance. Recent sea bed investigations in these areas have indicated that much of this material would be comparatively expensive to remove.

Whilst depths at the Rip have always been kept ahead of depths at harbor facilities within Port Phillip, many tankers that now enter Westernport could not do so at the Rip when fully loaded, and container vessels are showing every indication of being similarly deepened. General cargo is predicted to increase in volume, with a trend to larger size container ships. In the short term, congestion and lack of space will be expensive to overcome in Melbourne port, and the total cost of development including any deepening of the Rip and internal channels in Port Phillip Bay will have to be compared with costs for Westernport.

The centre of distribution for processed goods is now in the Waverley-Springvale area, resulting in a shift of warehousing, and there is increasing demand for import/export to and from the new south-eastern industrial areas.

On the non-commercial scale there are ever increasing pressures for pleasure boat facilities throughout the State. Westernport will undoubtedly have to accommodate its share of these craft, and considerable area could be involved.

EXISTING GUIDELINES AND CONSTRAINTS

Several major factors presently influence planning:

(i) Statement of Planning Policy No. 1, which proclaimed the State's intention to develop the North Arm areas as a port-industrial complex.

(ii) Statement of Planning Policy No. 2 which broadly restricts urban development in the southern section of the Mornington Peninsula.

(iii) The Westernport Environmental Study which is aimed at developing a sound water quality management policy.

(iv) A moritorium on major development in the area by the Government, pending the findings of Stage 1 of the Environmental Study (December 1974).

In addition (i) and (ii) are currently the subject of review by the State.

Obviously in this era of environmental awareness it will be no simple matter to reconcile the many opposing factors working in the area.

PRINCIPLES AND REQUIREMENTS

It would be appropriate at this stage to outline some of the factors that should be taken to account in port and regional planning.

(i) The unique value of a deep-water port site to both the State and the nation.

(ii) The restriction of the use of waterfront land for purposes for which it is essential, and the progressive separation of other industries from the waterfront, dependent on need: i.e. those that can be served by pipelines and those that can be located away from the waterfront without disadvantage.

(iii) The location of port facilities to make the best use of existing water depths and to minimize dredging cost and disturbance from both dredging and spoil disposal.

(iv) State Control of multiple-user wharves to maximize use, minimize facilities required.

(v) Use of reclaimed areas strictly for purposes that cannot be accommodated elsewhere.

(vi) Grouping of industries involving the use of dangerous cargoes.

(vii) Location of industries for the most effective dispersal of effluents (including thermal loading).

(viii) Proportioning of the dimensions of waterfront sites, with long axes at right angles to the shoreline, to ensure maximum use.

(ix) Avoidance of marginal freeways and access corridors that might restrict access to the waterfront or otherwise encourage non-priority enterprises.

(x) Extreme care in siting facilities such as airports which in their own right might have some claim to proximity to the water but which utilize enormous area, impose restrictions on the development of surrounding areas and attract major supporting services and access corridors, all of which could seriously impair port development.

(xi) Attention to the development of new forms of wharf designs and cargo handling methods to minimize interference to the environment.

(xii) The founding of structures and causeways on piles as far as possible.

(xiii) Establishment of visual corridors and undeveloped areas between groups of facilities.

(xiv) Establishment of adequate public reserves in marginal areas, or even on reclaimed ground if necessary.

(xv) Provision for both active and passive water-oriented recreational requirements.

METHODS AND TOOLS

In keeping with most other applied sciences, planning, particularly when it involves regions, has become increasingly more complex. Sophisticated methods and major inputs from multi-disciplinary groups are required. The co-ordination of these diverse segments is a major task in itself and often sufficient to occupy senior planners completely. For ports the closest liaison between land and port planners is required.

Traditionally, thorough in depth, desk-type studies have been used for engineering feasibilities, economic comparisons and transportation type studies. Whilst there is no substitute for most studies of this type detail planning can now be greatly assisted by the use of models, both physical and mathematical.

Broadly, physical models are applicable where engineering investigation requires detailed *three dimensional* description arising from tidal currents and movements. Such considerations are essential where any large-scale alterations are made to the shape of the water body.

Mathematical models are commonly used in *two dimensional* studies and permit the introduction of pollution transport and decay, evaporation and other factors, some of which cannot be physically modelled. Computer capacity and operation costs, however, limit grid sizes to the order of one km in the case of the model of Westernport, and this does not provide the fine detail of current movements required for engineering design.

Both types of model have their own special uses and are complementary in many ways.

The Westernport Environmental Study has provided a mathematical model of Westernport Bay on the basis of extensive field data obtained by the Ports and Harbors Division. This will be used to model pollution transport, dispersion and decay and to optimize alternative points and types of discharge to the Bay.

The Division is currently developing firm proposals for a large physical model of Westernport. The model would then be available as a management tool to investigate a variety of problems, and particularly any proposals for large-scale alterations to the hydraulic regime. For this it would be essential. Since the lead time to carry out the field work and to establish such a model is three to four years, it is essential that an early start be made. Notwithstanding the present moritorium, it seems inevitable that increasing population, consumer demand and State development will exert strong pressures for development following completion of the Environmental Study. Failure to establish such a tool could result in undue deferment of decisions, or worse, decisions without the best means of assessment. The model would require a building about 120 m x 120 m and expenditure of several million dollars.

POSSIBLE FUTURE DEVELOPMENTS

The problems confronting most ports relate to the availability of land and to water depths. Many ports had their origins in rivers and sheltered areas close to centres of population. Goods could be readily transported between port and consumer/producer and the reverse.

The scale of operations is now such that many ports both inside and outside Australia are being forced to migrate to areas outside their previous confines. Examples are Europort, Port of London, Botany Bay, Fremantle and Brisbane. The potential to avoid many of these costly difficulties experienced by others already exists within Westernport because of its size and undeveloped nature.

Modern technology is also of advantage. Both increased ship sizes and modern cargo handling techniques greatly reduce the extent of waterfront facilities previously required. This could reduce disruption to the environment. (Note, however, that land requirements may be greater.) Containerization in Melbourne has increased the throughput over wharves by as much as five to ten times; larger sized ships greatly reduce the number of berths and hence the amount of waterfront required. The turn round time for a 100,000 Dwt tanker at Westernport is less than 24 hours and for a large container vessel in Melbourne 5 days: conventional earlier vessels were in port much longer. Fewer large vessels generally mean higher safety standards. Furthermore, many bulk trades are now accommodated at dolphin berths, which have minimal disruptive effects on the environment.

Economy in scale is also evident in pollution control. Large industries are better able to arrange and to afford the very rigid control requirements applicable to discharges.

Whilst it is obviously not possible at this time to predict the nature of future developments in Westernport other than the extension of the existing industries, there are various and interesting possibilities. It must be stressed, however, that many of these, as listed below, are purely speculative.

Development of the Steel Industry: The steel industry has statutory rights to some 3,000 m of waterfront and considers that this will all be necessary if the site is to be fully developed. On the basis of present practice much of this wharfage would require land backing.

Extension of the oil industry: There is presently no pressure for such extension, but an additional berth or berths using present approach structures could enormously increase capacity with minimal effect on the environment. Such industries themselves could be served by pipeline and thus be located away from the waterfront.

Liquid Cargoes: Liquid cargoes could also be handled from single point moorings and through submarine pipelines.

Petrochemical and Other Bulk Industries: It should be possible to accommodate such industries with low cost dolphin-type berths and trestle approach structures. Waste discharges may create problems.

Container Trade: As stated earlier the relative difference in the cost of providing facilities at Melbourne could eventually influence the establishment of container facilities at Westernport. On present indications berths would be of the order of 300 m long with some 20 ha of land backing required for each. In established ports congestion due to lack of land, and transport costs for distribution, are of major concern.

Tasmanian Trade: The economies of the Tasmanian-mainland trade could eventually lead to the provision of a single mainland terminal to handle all sea-borne trade. Westernport would naturally be on the short list of sites. Land backed RORO or container facilities with land backing would be required.

Ship Building and Repair Industry: This industry is traditionally associated with steel industries. The general lack of large-scale repair facilities in Australia, the existence of a steel industry and terminal nature of the port for large ships all generate incentive, while the cost of Australian labour would be a contra influence. Such an industry requires relatively shallow water, is non-polluting, and could be located in the northern sector. The extent of ship building or repair in Australia is largely a question of Australian Government policy.

In addition to the foregoing which are harbor requirements, there have also been suggestions of causeways to French Island, and major reclamations for such items as airports and power stations.

CONCLUSION

Changing community values have exerted a major influence on port and regional planning. The contradictory nature of the philosophies involved makes this a very challenging era for planners.

On the one hand we have the increasing population and consumer demand in the Port Phillip District; on the other the curbs on development advocated by many interests and for a great variety of reasons. Such curbs, if adopted, must inevitably result in some change in living standards for the community. At present, there is lack of

sympathy between two different attitudes to the future.

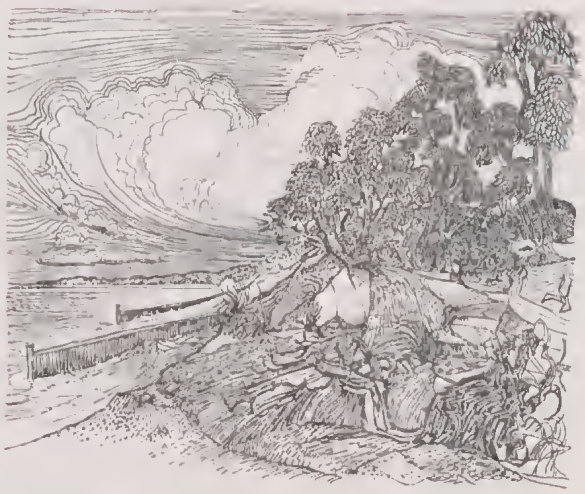
Water areas, intertidal zones and foreshore areas have attracted much public discussion and Westernport is a prime centre of public interest. The extent of this interest has been sufficient to exert considerable influence on policy formulation in the area. However, it could be noted that public opinion is largely concerned with industrial development, whilst it apparently ignores the urban growth which might well pose a much larger threat to such things as water quality.

Westernport as a deep-water port is of prime importance to the economic development of the State. With careful planning it is large enough to accommodate developments that can reasonably take account of the conflicting community values and requirements, but it is most important that the options to achieve a balanced development be kept open.

And here a comment, perhaps cynical, perhaps realistic. The influence of the conservation lobby has not yet required the public to accept any real responsibility. In other words, conservation has not yet affected the people's 'quality of life', their incomes and living standards. For comparison it could be noted that when there has been even a threat of this, in other countries, the conservation ideals of the public have quickly disintegrated. As a recent example we cite the energy crisis in U.S.A. and its influence on the controversial Alaska Pipeline and various areas of off-shore drilling.

There is a very genuine need for sensible conservation policies to be applied to planning as a whole. An excessive swing of the pendulum to a degree that cannot be sustained in the longer term may well be very detrimental to conservation and to an area such as Westernport.

In the meantime considerable resources are being applied to the overall planning of Westernport both ashore and in the port area, and there seems no reason why, with sound planning, a satisfactory compromise between conservation and development should not be achieved.



Phillip Island, 1973